

What is claimed is:

1. A data communication device comprising:

a line state monitoring unit for detecting a line state relating to transmission quality in a communication line and producing line state information indicating the line state; and

a transmission control unit, having a plurality of operation modes corresponding to a plurality of error tolerance levels different from each other, for selecting a specific operation mode from the operation modes according to the line state information produced by the line state monitoring unit and performing a transmission control for transmission data, which is planned to be sent out to the communication line, according to the specific operation mode.

2. A data communication device according to claim 1,

wherein the specific operation mode is changed to another operation mode by the transmission control unit in response to the change of the line state indicated by the line state information during the transmission of the data without suspending the transmission of the data, and the transmission control is performed for the transmission data according to the changed operation mode by the transmission control unit.

3. A data communication device according to claim 1,

wherein the transmission control unit has a plurality of data multiplexing methods corresponding to the operation modes, a specific multiplexing method is selected from the

multiplexing methods by the transmission control unit according to the line state information produced by the line state monitoring unit, and pieces of transmission data, which are planned to be sent out to the communication line,  
5 are multiplexed with each other to a stream of multiplexed transmission data according to the specific multiplexing method.

4. A data communication device according to claim 1,  
10 wherein the specific operation mode is changed to another operation mode corresponding to a high error tolerance level by the transmission control unit according to the line state information in cases where the line state information indicates a deteriorated line state, and the  
15 specific operation mode is changed to another operation mode corresponding to a low error tolerance level by the transmission control unit according to the line state information in cases where the line state information indicates an ameliorated line state.

20 5. A data communication device according to claim 1,  
further comprising:

an operation mode change request receiving unit for receiving an operation mode change request from a second  
25 data communication device and sending the operation mode change request to the transmission control unit to make the transmission control unit perform the transmission control for the transmission data according to a particular operation mode indicated by the operation mode change  
30 request.

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6. A data communication device according to claim 1,  
further comprising:

a line interface, connected with the communication line,  
5 for sending the transmission data to the communication  
line,

wherein the transmission control unit controls the line  
interface to add a new communication line connected with  
the line interface, in cases where the specific operation  
10 mode corresponds to a high error tolerance level, and to  
disconnect the new communication line from the line  
interface in cases where the specific operation mode is  
changed to a low error tolerance level.

15 7. A data communication device according to claim 1,  
further comprising:

a line interface for receiving and sending the  
transmission data to/from the communication line,  
wherein the transmission control unit controls the line  
20 interface to increase a data transfer rate for data sending  
while decreasing a data transfer rate for data reception  
by a degree of the increase of the data transfer rate for  
data sending in cases where the specific operation mode  
is changed to a particular operation mode corresponding  
25 to a high error tolerance level in the transmission control  
unit to perform the transmission control for the  
transmission data sent out to the communication line  
according to the particular operation mode.

30 8. A data communication device according to claim 1,

further comprising:

a line interface for receiving and sending the transmission data from/to the communication line, wherein the transmission control unit controls the line  
5 interface to decrease a data transfer rate for data sending while increasing a data transfer rate for data reception by a degree of the decrease of the data transfer rate for data sending in cases where the specific operation mode is changed to a particular operation mode corresponding  
10 to a low error tolerance level in the transmission control unit to perform the transmission control for the transmission data sent out to the communication line according to the particular operation mode.

~~15 9. A data communication device comprising:~~

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a line state monitoring unit for detecting a line state relating to transmission quality in a communication line and producing line state information indicating the line state;  
20 a transmission control unit, having a plurality of operation modes corresponding to a plurality of error tolerance levels different from each other, for selecting a specific operation mode from the operation modes according to the line state information produced by the line state monitoring unit and performing a transmission control for transmission data, which is sent out to the communication line or is received through the communication line, according to the specific operation mode; and  
25 an operation mode change request outputting unit for  
30 an operation mode change request outputting unit for

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31 requesting of a second data communication device, with  
which communication is performed through the  
communication line, that an operation mode selected in the  
second data communication device is changed to the specific  
5 operation mode selected by the transmission control unit.

10. A data communication device according to claim 9,  
wherein the request of the operation mode change request  
outputting unit to the second data communication device  
10 is performed during the sending or reception of the  
transmission data without suspending the sending or  
reception of the transmission data.

15. A data communication device according to claim 9,  
wherein the transmission control unit has a plurality of  
data multiplexing methods corresponding to the operation  
modes, a specific multiplexing method is selected from the  
multiplexing methods by the transmission control unit  
according to the line state information produced by the  
20 line state monitoring unit, and the operation mode change  
request outputting unit requests the second data  
communication device, during the transmission of the data  
without suspending the transmission of the data, to select  
the specific multiplexing method.

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12. A data communication device according to claim 9,  
wherein the operation mode change request outputting unit  
requests the second data communication device to change  
the specific operation mode to an operation mode  
30 corresponding to a high error tolerance level in cases

where the line state information produced by the line state monitoring unit indicates a deteriorated line state, and the operation mode change request outputting unit requests the second data communication device to change the specific 5 operation mode to an operation mode corresponding to a low error tolerance level in cases where the line state information produced by the line state monitoring unit indicates an ameliorated line state.

10 13. A data communication device according to claim 9, further comprising:

an operation mode change request receiving unit for receiving an operation mode change request from the second data communication device, and sending the operation mode 15 change request to the transmission control unit to make the transmission control unit perform the transmission control for the transmission data, which is received through the communication line or is sent out to the communication line, according to a particular operation 20 mode indicated by the operation mode change request.

14. A data communication device according to claim 9, further comprising:

a line interface, connected with the communication line, 25 for receiving or sending the transmission data from/to the communication line, wherein the transmission control unit controls the line interface to add a new communication line connected with the line interface, in cases where the specific operation 30 mode corresponds to a high error tolerance level, and to

disconnect the new communication line, which is connected with the line interface, from the line interface in cases where the specific operation mode corresponding to the high error tolerance level is changed to that corresponding to  
5 a low error tolerance level.

15. A data communication device according to claim 13, further comprising:

a line interface, connected with the communication line,  
10 for receiving or sending the transmission data from/to the communication line,  
wherein the operation mode change request receiving unit further receives a communication line adding request or a communication line disconnecting request from the second  
15 data communication device, the operation mode change request receiving unit sends the communication line adding request or the communication line disconnecting request to the transmission control unit, the transmission control unit controls the line interface to add a new communication  
20 line connected with the line interface according to the communication line adding request and changes the specific operation mode to an operation mode corresponding to a high error tolerance level according to the operation mode change request, and the transmission control unit controls  
25 the line interface to disconnect the new communication line, which is connected with the line interface, from the line interface according to the communication line disconnecting request and changes the specific operation mode to an operation mode corresponding to a low error  
30 tolerance level according to the operation mode change

request.

16. A data communication device according to claim 9,  
wherein the operation mode change request outputting unit  
5 requests the second data communication device to add a new  
communication line connected with the second data  
communication device in cases where the operation mode  
change request outputting unit requests the second data  
communication device to change the specific operation mode  
10 to an operation mode corresponding to a high error  
tolerance level, and the operation mode change request  
outputting unit requests the second data communication  
device to disconnect the new communication line, which is  
connected with the second data communication device, from  
15 the second data communication device in cases where the  
operation mode change request outputting unit requests the  
second data communication device to change the operation  
mode corresponding to the high error tolerance level to  
an operation mode corresponding to a low error tolerance  
20 level.

17. A data communication device according to claim 9,  
further comprising:

a line interface for receiving and sending the  
25 transmission data from/to the communication line,  
wherein the transmission control unit controls the line  
interface to increase a data transfer rate for data sending  
while decreasing a data transfer rate for data reception  
by a degree of the increase of the data transfer rate for  
30 data sending, in cases where the specific operation mode

is changed to a particular operation mode corresponding to a high error tolerance level in the transmission control unit to perform the transmission control for the transmission data sent out to the communication line  
5 according to the particular operation mode, and to increase a data transfer rate for data reception while decreasing a data transfer rate for data sending by a degree of the increase of the data transfer rate for data reception in cases where the specific operation mode is changed to a  
10 particular operation mode corresponding to a high error tolerance level in the transmission control unit to perform the transmission control for the transmission data received through the communication line according to the particular operation mode.

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18. A data communication device according to claim 9, further comprising:

a line interface for receiving and sending the transmission data from/to the communication line,  
20 wherein the transmission control unit controls the line interface to decrease a data transfer rate for data sending while increasing a data transfer rate for data reception by a degree of the decrease of the data transfer rate for data sending, in cases where the specific operation mode  
25 is changed to a particular operation mode corresponding to a low error tolerance level in the transmission control unit to perform the transmission control for the transmission data sent out to the communication line according to the particular operation mode, and to decrease  
30 a data transfer rate for data reception while increasing

a data transfer rate for data sending by a degree of the decrease of the data transfer rate for data reception in cases where the specific operation mode is changed to a particular operation mode corresponding to a low error  
5 tolerance level in the transmission control unit to perform the transmission control for the transmission data received through the communication line according to the particular operation mode.

10 19. A data communication device according to claim 13, further comprising:

a line interface for receiving and sending the transmission data from/to the communication line, wherein the operation mode change request receiving unit  
15 further receives a data rate change request from the second data communication device, the operation mode change request receiving unit sends the data rate change request to the transmission control unit, the transmission control unit controls the line interface to increase a data transfer rate for data sending while decreasing a data transfer rate for data reception by a degree of the increase of the data transfer rate for data sending according to the data rate change request, in cases where the specific operation mode is changed to a particular operation mode  
20 corresponding to a high error tolerance level in the transmission control unit according to the operation mode change request to perform the transmission control for the transmission data sent out to the communication line according to the particular operation mode, and the  
25 transmission control unit controls the line interface to  
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increase a data transfer rate for data reception while decreasing a data transfer rate for data sending by a degree of the increase of the data transfer rate for data reception according to the data rate change request in cases where  
5 the specific operation mode is changed to a particular operation mode corresponding to a high error tolerance level in the transmission control unit according to the operation mode change request to perform the transmission control for the transmission data received through the  
10 communication line according to the particular operation mode.

20. A data communication device according to claim 9, wherein the operation mode change request outputting unit  
15 requests the second data communication device to increase a data transfer rate for data sending while decreasing a data transfer rate for data reception by a degree of the increase of the data transfer rate for data sending, in cases where the operation mode change request outputting  
20 unit requests the second data communication device to change the specific operation mode to a particular operation mode corresponding to a high error tolerance level in the transmission control unit according to the operation mode change request to perform the transmission control for the transmission data sent out to the  
25 communication line according to the particular operation mode, and the operation mode change request outputting unit requests the second data communication device to increase a data transfer rate for data reception while decreasing a data transfer rate for data sending by a degree of the  
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increase of the data transfer rate for data reception in cases where the operation mode change request outputting unit requests the second data communication device to change the specific operation mode to a particular

5 operation mode corresponding to a high error tolerance level in the transmission control unit according to the operation mode change request to perform the transmission control for the transmission data received through the communication line according to the particular operation mode.

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